NOAA Fisheries
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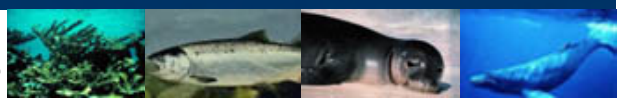

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Killer Whale *(Orcinus orca)*

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Status

Killer whales are widely distributed in the world's oceans, but the status of most populations of killer whales is unknown. Only two populations receive special protections under Federal law:
ESA Endangered - Southern Resident population* * under review for delisting
MMPA Depleted - AT1 Transient population and Southern Resident population
MMPA - all populations of killer whales, like all marine mammals, are protected under the MMPA
CITES Appendix II - all populations throughout its range

Killer Whales
(Orcinus orca)
Credit: NOAA

Did You Know?

- Killer whales can grow as long as 32 feet (9.8 m) and can weigh as much as 22,000 pounds (10,000 kg)!
- Killer whales are actually a member of the dolphin family, Delphinidae.
- Killer whales are highly social and often travel in groups of up to 40-50.

Taxonomy

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Cetacea
Family: Delphinidae
Genus: *Orcinus*
Species: *orca*

Species Description

Weight: males can weigh up to 22,000 pounds (10,000 kg); females can weigh up to 16,500 pounds (7,500 kg)

Length: males can reach 32 feet (10 m); females can reach 28 feet (8.5 m)

Appearance: black on top with white undersides and white patches near their eyes

Lifespan: males typically live for about 30 years, but can live as long as 50-60 years; females typically live about 50 years,but can live as long as 80-90 years

Diet: diet is often geographic or population specific and varies from fish to other marine mammals to sharks

Behavior: highly social animals; rely on underwater sound for orientation, feeding, and communication; make whistles and pulsed calls, believed to be used for communication and during social activities

A **killer whale** performs at Sea World of Texas.
Credit: Jennifer Skidmore

Killer whales are the most widely distributed cetacean species in the world and likely represent the most widely distributed mammal species in the world.

Killer whales are generally considered monotypic (belonging to one species); however, over the years, scientists have proposed several new

Orphan Orca: Saving Springer video

Credit: NOAA

years, scientists have proposed several new species, such as dwarf forms in Antarctic waters.[1] Genetic studies and morphological evidence have led many cetacean biologists to now consider the existence of multiple species or subspecies of killer whales worldwide.

Killer whales have a distinctive color pattern, with black back (dorsal) and white belly (ventral). They also have a conspicuous white patch above and behind the eye and a highly variable gray or white saddle behind the dorsal fin.

The species shows considerable size "dimorphism". Adult males develop larger pectoral flippers, dorsal fins, tail flukes, and girths than females.

Most information on killer whale life history and biology is from long-term studies of several populations in the eastern North Pacific.

Sexual maturity of female killer whales is achieved when the whales reach lengths of approximately 15-18 feet (4.6 m-5.4 m), depending on geographic region. The gestation period for killer whales varies from 15-18 months, and birth may take place in any month--there is no distinct calving season. Calves are nursed for at least 1 year, and may be weaned between 1 and 2 years of age. The birth rate for killer whales is not well understood, but, in some populations, is estimated as every 5 years for an average period of 25 years.

The diet of killer whales is often geographic or population specific:

- In the eastern North Pacific, the "resident" killer whale populations mainly feed on
  - salmonids, such as Chinook salmon and chum salmon
- "Transient" populations in the eastern North Pacific feed on marine mammals, such as (in order of frequency of observation)
  - harbor seals
  - Dall's porpoises
  - harbor porpoise
  - California sea lions
  - gray whale calves
  - Steller sea lions
  - elephant seals
  - minke whales
  - various other species of pinnipeds and cetaceans
- Off the coast of Norway, some killer whales feed mainly, often in a coordinated manner, on
  - herring
  - other schooling fish
- In waters off New Zealand, some killer whales feed on
  - stingrays
  - sharks
- In Antarctic waters, there are different types of killer whales. They have each been observed feeding off of various species:
  - type 'A' killer whales feed on minke whales
  - type 'B' killer whales feed on seals within the seasonal ice pack
  - type 'C' killer whales feed on Antarctic toothfish (*Dissostichus mawsoni*) and other fish species

Killer Whale pod
(Orcinus orca)
Credit: NOAA

Killer whales are highly social animals that occur primarily in relatively stable social groups that often range in size from 2 to 15 animals. Larger groups (rarely as large as several hundred individuals) occasionally form, but are usually considered temporary groupings of smaller social units that probably congregate near seasonal concentrations of prey, for social interaction, or mating. Single whales, usually adult males, also occur in many populations. Differences in spatial distribution, abundance, behavior, and availability of food resources probably account for much of the variation in group size among killer whale populations.

Like all cetaceans, killer whales depend heavily on underwater sound for orientation, feeding, and communication. Killer whales produce three categories of sounds:

1. clicks
2. whistles
3. pulsed calls

3. pulsed calls

Echolocation clicks are believed to be used primarily for navigation and discriminating prey and other objects in the surrounding environment, but are also commonly heard during social interactions and may have a communicative function.

Whistles and pulsed calls are believed to be used for communication and during social activities. Whistles are frequency modulated sounds (pitch changes with time) with multiple harmonics. Pulsed calls are the most common type of vocalization in killer whales and resemble squeaks, screams, and squawks to the human ear. Most calls are highly distinctive in structure, and are characterized by rapid changes in tone and pulse repetition rate. Many calls are repeated, with some clicks reaching up to 4,000 or more pulses per second.[2]

Killer whales of different populations have specific vocalization types. In addition, even within the same population, dialects are known to exist among different pods of "resident" populations in the eastern North Pacific.[3]

In the eastern North Pacific Ocean, three distinct forms, or types, of killer whales are recognized.[4]

1. residents
2. transients
3. offshores

Killer Whale Ecotypes and Forms poster
NOAA Southwest Fisheries Science Center

The three types differ in morphology, ecology, behavior, and genetics. A recent genetic study[5] suggests the transient type has been separated from all other killer whales for approximately 750,000 years and might represent a separate species or subspecies. All three types of killer whales share at least part of a home range, yet they are not known to intermix with one another. The resident and transient types both have multiple populations within their range.

Resident Killer Whales are noticeably different from both transient and offshore forms. The dorsal fin is rounded at the tip and curved and tapering, or "falcate". Resident whales have a variety of saddle patch pigmentations with five different patterns recognized. They've been sighted from California to Russia. Resident whales primarily eat fish.

Resident killer whales in the North Pacific consist of the following populations:

- Southern residents
- Northern residents
- Southern Alaska residents
- Western Alaska North Pacific residents


Southern Resident Killer Whale Satellite Tagging
NOAA Northwest Fisheries Science Center

Resident type killer whales occur in large social groups termed "pods," which are defined to be groups of whales that are seen in association with one another greater than 50% of the time. The pods represent collections of matrilines (a matriarch and all her descendents), which have been found to be the stable social unit.

The Southern Resident killer whale population contains three pods--J, K, and L pods--considered one "stock" under the Marine Mammal Protection Act (MMPA) and as a "distinct population segment" (therefore, "species") under the Endangered Species Act (ESA).

Their range during the spring, summer, and fall includes the inland waterways:

- Puget Sound (Washington state)
- Strait of Juan de Fuca (boundary between the United States and Canada)
- Southern Georgia Strait (between Vancouver Island and British Columbia, Canada)

Their occurrence has also been documented in the coastal waters off of:

- Oregon
- central California
- Queen Charlotte Islands

- Queen Charlotte Islands

Relatively little is known about the winter movements and range of the Southern Resident stock. Southern Residents have not been observed associating with other resident whales, and genetic data suggest that Southern Residents rarely, if ever, interbreed with other killer whale populations.

Transient Killer Whales occur throughout the eastern North Pacific, and have primarily been studied in coastal waters. Their geographic range overlaps that of the resident and offshore killer whales. The dorsal fin of transient whales tends to be straighter at the tip than those of resident and offshore whales.[6] Saddle patch pigmentation of transient killer whales is restricted to two patterns, and the large areas of black color don't mix into the white of the saddle patch that is seen in resident and offshore types. Transient type whales are often found in long-term stable social units of less than 10 whales, smaller than resident social groups. Transient killer whales feed nearly exclusively on other marine mammals.[7]

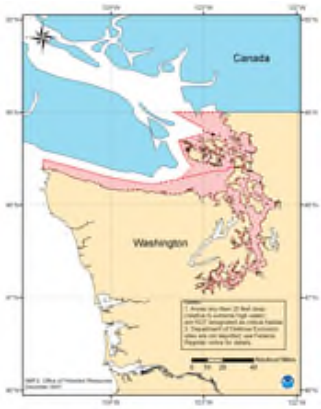
Offshore Killer Whales are similar to resident whales, but can be distinguished generally[8] by features such as their:

- rounded fins with multiple nicks on the edge
- smaller overall size
- tendency for males and females to be more similar in size (less "sexual dimorphism")

Offshores have the largest geographic range of any killer whale community in the northeastern Pacific and often occur 9 miles (15 km) or more offshore, but also visit coastal waters and occasionally enter protected inshore waters. Animals typically congregate in groups of 20-75 animals with occasional sightings of larger groups up to 200 whales. They are presumed to feed primarily on fish, though they have been documented feeding on sharks. Genetic analyses indicate that offshore killer whales are reproductively isolated from other forms of killer whales.

Habitat

Killer whales are most abundant in colder waters, including Antarctica, Norway, and Alaska. However, killer whales can also be fairly abundant in temperate waters. Killer whales also occur, though at lower densities, in tropical, subtropical, and offshore waters.



Southern Resident Killer Whale Critical Habitat
(click for larger view PDF)

Following the listing of the Southern Residents as an endangered species in 2005, NMFS designated critical habitat in November 2006

Distribution

Killer whales are the most widely distributed marine mammals. They are found in all parts of the oceans and in most seas from the Arctic to the Antarctic.

In the North Pacific Ocean, killer whales are often sighted in all parts of Alaska, including:

- Bering Sea
- Aleutian Islands
- Prince William Sound
- southeastern Alaska


Killer Whale Range Map
(click for larger view PDF)

They are also often sighted in other areas of the North Pacific Ocean, such as:

- nearshore and intercoastal waterways of British Columbia, Canada and Washington state
- along the U.S. Pacific coast in Washington, Oregon, and California
- along the Russian coast in the Bering Sea and the Sea of Okhotsk on the eastern side of Sakhalin and the Kuril Islands

In the North Atlantic Ocean, sightings of killer whales are commonly documented up to the pack ice edge:

- in Norwegian waters
- around Iceland

In the South Atlantic and Pacific Oceans, killer whales are frequently sighted off the coasts of:

- Antarctica, along the pack ice
- Patagonia
- southern Argentina
- New Zealand

Population Trends

Killer Whale spyhopping
(Orcinus orca)
Credit: NOAA

Scientific studies have revealed many different populations--or even potentially different species or subspecies--of killer whales worldwide. These different populations of killer whales may exhibit different dietary needs, behavior patterns, social structures, and habitat preferences. Therefore, interbreeding is not expected to occur between different populations, in spite of the overlap between home ranges. Because of its cosmopolitan distribution, there is no global population assessment for killer whales.

Little information is available on the historical abundance of killer whales worldwide. Nevertheless, it is likely that many populations have declined significantly since 1800 in response to greatly diminished stocks of fish, whales, and pinnipeds (seals and sea lions) in the ocean. The population size of killer whales is difficult to measure in many areas because of their general scarcity as well as their widespread and often unpredictable movement patterns.

During the past few decades, populations have been surveyed primarily through

- photo-identification studies
- line-transect counts

Photo-identification catalogs for killer whales were first established in the early 1970s for the resident communities of Washington and British Columbia and currently are conducted with most population studies.

Line-transect surveys from ships or aircraft generally occur in large areas of open ocean where photo-identification is impractical. However, this technique cannot be used for gathering most demographic data, such as age of sexual maturity.

As top-level predators, killer whales occur in low densities throughout most of their geographic range. Densities are typically much greater in colder waters than in tropical regions. One estimate put the worldwide population of killer whales at over 100,000 animals.[9] However, the most recent estimate revised this figure to a minimum of about 50,000 animals.[10] In the northeastern Pacific (from California to the western Aleutian Islands and Bering Sea) the population is estimated around 2,500 killer whales.

The Southern Resident Killer Whale population is currently estimated at about 85 whales, a decline from its estimated historical level of about 200 during the late 1800s. Beginning in the late 1960s, the live-capture fishery for oceanarium display removed an estimated 47 whales and caused an immediate decline in Southern Resident numbers.[11] The population fell an estimated 30% to about 67 whales by 1971.[12] By 2003, the population increased to 83 whales.[13] Due to its small population size, NMFS listed this segment of the population as endangered under the Endangered Species Act (ESA).

The AT1 Transient Killer Whale group was one of the most frequently encountered groups and, in the 1980s, was sighted year-round in Prince William Sound. The AT1 group was made up of at least 22 whales, but has been reduced by more than half since the 1989 Exxon Valdez oil spill. Several confirmed deaths of AT1 killer whales were recorded since the 1990s, while other missing animals are presumed dead.[14] In June 2004, NMFS designated the AT1 group of transient killer whales as a depleted stock under the MMPA. Scientists estimate there are only 7 killer whales remaining in this group.

Threats

Historically

- commercial hunting
- live capture for aquarium display
- culling due to depredation of fisheries, especially of the Southern Resident stock

Currently

- contaminants (e.g., PCBs)

- contaminants (e.g., PCBs)
- depletion of prey due to overfishing and habitat degradation
- ship collisions
- oil spills
- noise disturbance from industrial and military activities
- entanglement in fishing gear
- whale-watching can be a threat if not conducted responsibly

Outside U.S. waters, directed catch of killer whales still occurs, though these levels are presumed low.

Conservation Efforts

A final recovery plan for the Southern Resident killer whales [pdf] [1.7 MB] was published on January 24, 2008. The Recovery Plan for Southern Resident Killer Whales was based on the Proposed Conservation Plan for Southern Resident Killer Whales (under the MMPA), after comments on it were addressed and required ESA elements incorporated into it. The proposed ESA recovery plan was released for comment in November 2006. Public and peer review comments as well as new research results and references were then incorporated into the final Southern Resident recovery plan.

Conservation measures in the plan include to:

- Support salmon restoration efforts in the region including habitat, harvest, and hatchery management considerations and continued use of existing NMFS authorities under the ESA and Magnuson-Stevens Fishery Conservation and Management Act to ensure an adequate prey basis.
- Clean up existing contaminated sites, minimize continuing inputs of contaminants harmful to killer whales, and monitor emerging contaminants.
- Continue evaluating and improving guidelines for vessel activity near Southern Resident and evaluate the need for regulations or protected areas.
- Prevent oil spills and improve response preparation to minimize effects on Southern Resident and their habitat in the event of a spill.
- Continue agency coordination and use of existing MMPA mechanisms to minimize potential impacts from anthropogenic sound.
- Enhance public awareness, educate the public on actions they can participate in to conserve killer whales, and improve reporting of Southern Resident sightings and strandings.
- Improve responses to live and dead killer whales to implement rescues, conduct health assessments, and determine causes of death to learn more about threats and guide overall conservation efforts.
- Coordinate monitoring, research, enforcement, and complementary recovery planning with international, Federal, and state partners.
- Conduct research to facilitate and enhance conservation efforts. Continue the annual census to monitor trends in the population, identify individual animals, and track demographic parameters.

Conservation of the Southern Resident stock is a long-term effort that requires the cooperation and coordination of the Washington and British Columbia communities. The Plan was developed with input from a variety of stakeholders, including federal and state agencies, tribes, non-profit groups, industries, the academic community, and concerned citizens.

Regulatory Overview

All marine mammals, including killer whales, are protected in the United States under the MMPA.

The AT1 stock of the North Pacific transient killer whale was designated as depleted under the MMPA after its drastic decline after the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska.

In November 2005, the Southern Resident population was listed as endangered under the ESA. NMFS designated critical habitat in November 2006 for the Southern Resident population.

NMFS' Northwest Region developed vessel regulations in Washington state [pdf] (76 FR 20870) to prohibit vessels from approaching killwe whales within 200 yards that went into effect in May 2011.

NMFS conducted a 5-year review of the Southern Residents in January 2011.

Key Documents

(All documents are in PDF format.)

Title	*Federal Register*	Date
Positive 90-day finding on a petition to include "Lolita" in the ESA Listing of Southern Resident Killer Whales ▪ Regulations.gov docket folder ▪ Petition to include "Lolita" in the Southern Residents	78 FR 25044	04/29/2013
Positive 90-day finding on a petition to delist the Southern Resident killer whale ▪ Public comments on the finding ▪ Petition to delist	77 FR 70733	11/27/2012
Vessel regulations in Washington state for Southern Residents	76 FR 20870	04/14/2011
5-year Review Initiated for Southern Residents	75 FR 17377	04/06/2010
Proposed killer whale vessel regulations in Washington state	74 FR 37674	07/29/2009
Recovery Plan for Southern Residents	73 FR 4176	01/24/2008
Critical Habitat Designation for Southern Residents	71 FR 69054	11/29/2006
ESA Listing Rule for Southern Residents	70 FR 69903	11/18/2005
Proposed Conservation Plan for Southern Residents	70 FR 57565	10/03/2005
Status Review of Southern Residents	n/a	12/2004
Depleted Designation of AT1 Transients	69 FR 31321	06/03/2004
Depleted Designation for Southern Residents	68 FR 31980	05/29/2003
Stock Assessment Reports	n/a	various

More Information

- NMFS National Marine Mammal Laboratory Killer Whale Information and Research
- Satellite Tagging of Southern Residents
- NMFS Northwest Fisheries Science Center Southern Resident Research
- NMFS Northwest Regional Office Killer Whale information
- NMFS Southwest Fisheries Science Center Killer Whale information
- Publications about Killer Whales

Footnotes and Further Reading

1. Pitman and Ensor, 2003
2. Jehl *et al.*, 1980; Ford, 1989
3. Ford, 1991
4. Ford *et al.*, 2000
5. Morin *et al.*, in press
6. Ford and Ellis, 1999; Ford *et al.*, 2000
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9. Reeves and Leatherwood, 1994
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11. Ford *et al.*, 2000
12. Olesiuk *et al.*, 1990
13. Ford *et al.*, 2000
14. Matkin and Saulitis, 1997

Updated: July 1, 2013